Dairy Technology Syllabus
B. Voc. Programme for Autonomous from Academic Year 2019-20

Sub. Code.	Semester-1	Credits	Marks
	Theory (General Education Component)		
BDT-101	Dairy Development	04	100
BDT-102	Dairy Farm Management	04	100
BDT-103	Dairy Chemistry	04	100
	Practical (Skill Component)		
BDT-1.1	Dairy Farm Management	06	150
BDT-1.2	Dairy Chemistry	06	150
BDT-1.3	Soft Skill Development	06	150
	Total	**30**	**750**
	Semester-2		
	Theory (General Education Component)		
BDT-201	Food Preservation Technology	04	100
BDT-202	Milk Processing Technology	04	100
BDT-203	Dairy Microbiology	04	100
	Practical (Skill Component)		
BDT-2.1	Food Preservation Technology	06	150
BDT-2.2	Dairy Microbiology	06	150
BDT-2.3	Computer Application	06	150
	Total	**30**	**750**
	Total First Year	**60**	**1500**
	Semester-3		
	Theory		
BDT-301	Dairy Processing Equipments	04	100
BDT-302	Fermented Milk Products	04	100
BDT-303	Nutrition Science	04	100
	Practical		
BDT-3.1	Dairy Processing Equipments	06	150
BDT-3.2	Fermented Milk Products	06	150
BDT-3.3	Nutrition Science	06	150
	Total	**30**	**750**
	Semester-4		
BDT-401	Dairy Engineering	04	150
BDT-402	Traditional Indian Dairy Products	04	150
BDT-403	Food Safety, Hygiene & Sanitation	04	150
	Practical (Skill Based Component)		
BDT-4.1	Dairy Engineering	06	150
BDT-4.2	Traditional Indian Dairy Products	06	150
BDT-4.3	Food Safety, Hygiene & Sanitation	06	150
	Total	**30**	**750**
	Total Second Year	**60**	**1500**

	Semester-5			
	Theory (General Education Component)			
BDT-501	Dairy Dessert & Dried Products		04	100
BDT-502	Packaging Technology		04	100
BDT-503	Quality Management		04	100
	Practical (Skill Based Component)			
BDT-5.1	Dairy Dessert & Dried Products		06	150
BDT-5.2	Packaging Technology		06	150
BDT-5.3	Quality Management		06	150
	Total		**30**	**750**
	Semester-6			
BDT-601	Food Laws and Regulations	2 Months	04	100
BDT-602	Dairy Plant Management		04	100
BDT-603	Entrepreneurship Development		04	100
BDT-6.1	Mini Project		06	150
BDT-6.2	In-Plant Training/ Project	3 Months	12	300
	Total		**30**	**750**
	Total Final Year		**60**	**1500**
	Total for three years		**180**	**4500**

Note:

- One compulsory visit to field/industry/institute for practical papers in all semesters
- Report Submission and PPT presentation of visit report is mandatory
- Seminar Report preparation and PPT presentation mandatory for each theory papers.
- Group discussion/case study based on local/regional/national social economic aspects.

B. Voc. First Year **Paper No. BDT-101** **Semester I**

Dairy Development (Theory-General Education)

Maximum Marks: 100 **Credits: 4**

Teaching Period: 4 Theory **Teaching Load: 60 Theory Period**

Objective

- **To acquaint with properties and role of various constituents in foods, interaction and changes during processing.**
- **To acquaint with importance of various foods and nutrients in human nutrition.**
- **To acquaint with different groups of micro-organisms associated with food, their activities, destruction and detection in food.**

Unit-1 Dairy Development and Dairy Co-operatives in India **12 Periods**

History of Dairy Development and Co-operative Society in India, National Dairy Development Board, National Dairy Research Institute, Military dairy farm, IDC, Dairy Co-operatives, Milk Grid, Operation Flood.

Unit-2 Government Policies and Incentives: **12 Periods**

Schemes for Development of Dairying, Assistance to Cooperatives, Intensive Dairy Development Programme (IDDP), Incentive schemes for Farmers, youth and Entrepreneurs, Dairy/Poultry venture capital fund, Other Schemes for dairying

Unit-3 Market Milk: **12 Periods**

Definition, Factors affecting composition of milk, Clean milk production, Judging and grading of milk, Flavor defects of milk their causes and prevention, Uses of milk.

Unit-4 Animal Husbandry Practices and Health Care: **12 Periods**

Introduction to animal husbandry, Digestive system of ruminants and measures of feed energy. Nutrients requirements for growth and milk production. Feeding standards, Structure and function of mammary system. Milk secretion and milk let-down.

Unit-5 Milk Procurement: Clean and Hygienic milk production, milk procurement from the rural milk producer and its transportationand modes of payment. **12 Periods**

References:

- Dairying in India, Khurody D. N. (1974) Asia Publishing House
- Cooperation Principles and Substance, Gokhale Institute of Politics, New Delhi
- Cooperatives in India, Mathur (1977) SahityaBhavan, Agra
- Dairy Management, Pandit Sunder Lal Sharma Institute of vocational guidance 1998

B. Voc. First Year **Paper No. BDT-102** **Semester I**

Dairy Farm Management (Theory-General Education)

Maximum Marks: 100 **Credits: 4**

Teaching Period: 4 Theory **Teaching Load: 60 Theory Period**

Objectives-

- **To know the need and importance of dairy farm.**
- **To study the milking techniques, feed management and farm waste management**

Unit-1 Introduction to dairy farm management: Dairy farm management-introduction, definition, principles, skills in Dairy farming, future scope of dairy management, constraints in dairy farming, Farm Waste Management: Production of Bio-fertilizer. **12 Periods**

Unit-2 Milking Techniques: Types of milking techniques-Hand and Machine, steps of milking, milking management, testing of machines, maintenances of machines, cleaning routine of machine in parlour. **12 Periods**

Unit-3 Feed Management: Basic principles of feed and fodder management, important feed ingredients, feed mixing, feeding management, cultivation of fodder and nutrition of different fodder, shelter requirement and housing of dairy animals **12 Periods**

Unit-3 Cattle Breed: **12 Periods**

Distinguishing characteristics of India and exotic breeds of dairy animals and their performance. Systems of breeding and methods of selection of dairy animals. General dairy farm practices - Identification, dehorning, castration, exercising, grooming, weighing. Common disease problem in dairy animals, their prevention and controls

Unit-5 Dairy Management and Entrepreneurship: Concept of entrepreneurship; entrepreneurial and managerial characteristics; managing an enterprise; motivation and entrepreneurship development; importance of planning, monitoring, evaluation and follow up; managing competition; entrepreneurship development programs; SWOT analysis of Dairy. **12 Periods**

References:

- Livestock and Poultry Production, (1982) Singh Harbans and Moore Earl N.
- Livestock Production Management, (1999)Sastry N.S.R Kalyani Publishers
- ICAR , Handbook of animal Husbandary (2002)

B. Voc. First Year **Paper No. BDT-103** **Semester I**

Dairy Chemistry (Theory-General Education)

Maximum Marks: 100 **Credits: 4**

Teaching Period: 4 Theory **Teaching Load: 60 Theory Period**

Objectives-

- **To understand the chemistry of milk and its products, composition, role of each component and their interactions.**
- **To understand preservatives and processing of milk.**
- **To study the adulteration in milk and milk products**

Unit 1: Introduction to dairy chemistry **12 Periods**

Definition and structure of milk, factors affecting composition of milk, Physico-chemical properties of milk Nutritive value of milk, colostrum, Coagulation of Milk with Heat, acid, enzymes and alcohol.

Unit 2: Proteins **12 Periods**

Nomenclature and classification of milk proteins, casein, α-Lactalbumin and β lactoglobulin, Immmunoglobulin and other minor milk proteins and non-proteins nitrogen constituents of milk, Hydrolysis and denaturation of milk proteins under different physical and chemical environments, Milk enzymes with special reference to lipases, Xanthine Oxidase, phosphates, proteases and lacto peroxidase.

Unit 3: Carbohydrates **12 Periods**

Carbohydrates and its classification, Milk carbohydrates their status and importance. Physical and chemical properties of lactose, processing related degradation of lactose

Unit 4:Lipids **12 Periods**

Definition, general composition and classification of milk lipids. Nomenclature and general structure of glycerides, Structure of FG, Chemistry of FGM, factors affecting the fatty acid composition. Milk phospholipids and their role in milk products, Rancidity and it's control

Unit 5:Vitamins & Minerals **12 Periods**

Unsaponifiable matter and fat soluble vitamins, Milk Salts: Mineral in milk (a) major mineral (b) Trace elements, physical equilibria among the milk salts and Milk contact surfaces and metallic contamination.

References:

- Principles of dairy chemistry (1959) Jenness R and Patton S. John Wiley's, USA
- Fundamentals of Dairy chemistry, (1979) Webb B.H.
- Test book of Dairy Chemistry (1999) ICAR

B. Voc. First Year **Paper No. BDT-1.1** **Semester I**

Dairy Farm Management (Practical-Skill Component)

Maximum Marks: 150 **Credits: 6**

Teaching Period: 4 Theory **Teaching Load: 60 Theory Period**

- **To know the need and importance of dairy farm.**
- **To study common practices carried out at a dairy farm.**
  1. Identification of different milch breeds of cattle, buffalo, goats and external anatomy of dairy animals 4P
  2. Housing of animals and maintenance of hygienic conditions at farm 2P
  3. Clean milk production 3P
  4. Detection of Starch in Milk 1P
  5. Detection of Cane Sugar in Milk 2P
  6. Detection of Glucose in Milk 2P
  7. Detection of Urea in Milk 2P
  8. Detection of Ammonium Sulphate in Milk 2P
  9. Detection of Sodium Carbonate Or Bicarbonate As Neutralizer in Milk 2P
  10. Field/Farm visit 4P
  11. Activity-Visit to farm (Identification of feed & fodder, their report, photograph collection on farm visit)

B. Voc. First Year **Paper No. BDT-1.2** **Semester I**

Dairy Chemistry (Practical-Skill Component)

Maximum Marks: 150 **Credits: 6**

Teaching Period: 4 Theory **Teaching Load: 60 Theory Period**

Objectives-

To learn basic analysis methods used in dairy industry.

1. Preparation of Standard 0.1N Sodium Hydroxide Solution 2P

2. Preparation of Standard 0.1N Hydrochloric Acid 2P
3. Preparation of Gerber Acid for Determination of Fat in Milk 2P
4. Sampling of Milk 1P
5. Platform Test - (I) Colt – On – Boiling Test 1P
6. Platform Test – (Ii) Alcohol Test 1P
7. Platform Test – (Iii) Sediment Test 1P
8. Determination of Fat in Milk by Gerber Method 2P
9. Determination of Solid – not – Fat (SNF) in Milk 2P
10. Determination of Total Solid (TS) in Milk 2P
11. Specific Gravity of Milk 1P
12. Determination of Titratable Acidity of Milk 2P
13. Determination of pH of Milk 1P
14. Resazurin Reduction Test 2P
15. Methylene Blue Reduction (MBR) Test 2P
16. Activity-preparation of chemicals of different normality used for milk analysis

B. Voc. First Year **Paper No. BDT-1.3** **Semester I**

Soft Skill Development (Practical-Skill Component)

Maximum Marks: 150 **Credits: 6**

Teaching Period: 4 Theory **Teaching Load: 60 Theory Period**

Objectives-

- **To acquaint with commination skill of English language in corporate world.**
- **To know the writing skill of scientific report (Seminar/In-Plant training/Project Report) and other project proposals for finance**

Unit 1 Fluency in Grammar Usage **5P**

1) Tenses
2) Verbs
3) Active & Passive Voice
4) Reported Speech
5) Prepositions
6) Conjunctions
7) Effective Sentence-Construction
8) Vocabulary

Unit 2 Fundamentals **5P**

1) Greeting and taking leave
2) Introducing yourself
3) Introducing people to one another
4) Making requests and asking for directions
5) Congratulating, expressing sympathy and offering condolence
6) Making suggestions and offering advice
7) Making and accepting an apology

Unit 3 Situational dialogues **3P**

Unit 4 Personality development **3P**

Unit 5 Interview and Group discussion **3P**

Unit 6 Writing and comprehension skills **5P**

1) Letter (Formal) and Email
2) Report
3) Summarizing reports, articles, editorials
4) Making an abstract
5) Review writing
6) Writing resume

Activity- (Square talks , Back and back conversation listening and writing)

B. Voc. First Year **Paper No. BDT-201** **Semester II**

Food Preservation Technology (Theory-General Education)

Maximum Marks: 100 **Credits: 4**

Teaching Period: 4 Theory **Teaching Load: 60 Theory Period**

Objectives:

- **To study methods of preservation of foods**
- **To study the natural and chemical preservatives i.e. Class I and Class II Preservatives**

Unit-1: Introduction to preservation **10 Periods**

Definition, Introduction to preservation, History of preservation, general principles of food preservation, Need & benefits of industrial food preservation

Unit-2: Food Preservation by drying **15 Periods**

Types of drying, changes during drying, effect of drying on food, advantaged and disadvantages of drying

Unit-3: Food preservation by High & Low temperature **15 Periods**

Preservation by high temperature: Blanching, pasteurization & Canning, Effect of heat on food and micro-organisms Preservation by low temperature: Chilling, Refrigeration &freezing Effect of low temperature on food & microorganisms

Unit-4: Food preservation by irradiation **10 Periods**

Introduction & units of irradiation, mechanism of action of radiation, radiation process, effect of radiation on food, effect of radiation on micro-organisms

Unit-5: Food preservation by other methods **10 Periods**

Definition of preservative, Types of preservatives - Class I & Class II, Carbonation, Antibiotics, Fermentation & Filtration

References:

- Handbook of Food preservation (1999) M. Shafiur Rahman CRC Press
- Food Preservation techniques (2003) Peter Zeuthen
- The Technology of food preservation 4th Edition (2006) Norman W. Desroier

B. Voc. First Year **Paper No. BDT-202** **Semester II**

Milk Processing Technology (Theory-General Education)

Maximum Marks: 100 **Credits: 4**

Teaching Period: 4 Theory **Teaching Load: 60 Theory Period**

Objectives-

- **To study the methods of the collection and transportation of milk.**
- **To study hygiene and sanitation in dairy industry.**
- **To know the processing and packaging materials and machineries for milk and milk products.**

Unit 1 Milk Reception **12 Periods**

Milk Collection and Transportation, Milk Reception at The Dairy Dock, Milk Chilling and Storage

Unit 2 Processing of milk **12 Periods**

Clarification, Separation, Bactofugation and StandardizationPasteurization and Homogenization

Unit 3 Sterilization and Ultra-High-Temperature Processing **12 Periods**

Definition Theoretical Basis Types of Sterilization Plants Description of the Canning Process Quality of Sterilized Milk.

Unit 4 UHT

Ultra High Temperature Processing Definition Theoretical Basis for UHT Processing Types of UHT Sterilization Plants Changes in Milk during Processing Aseptic Packaging Types of Sterilizing Medium Types of Packaging Materials Description of Aseptic Packaging Systems

Unit 5 Special Milks **12 Periods**

Sterilized milk, Homogenized milk, Flavoured milk, Toned milk, Double toned milk, standardized milk, rehydrated milk, recombinant milk, UHT milk.

References:

- Outlines of Dairy Technology, (1980) Sukumar De
- The technology of milk processing, (1991) Khan A.Q
- Manual for milk plant operations, (1957) Washington
- Food engineering and Dairy technology (1981) Kessler H.G.

B. Voc. First Year **Paper No. BDT-203** **Semester II**

Dairy Microbiology (Theory-General Education)

Maximum Marks: 100 **Credits: 4**

Teaching Period: 4 Theory **Teaching Load: 60 Theory Period**

Objectives-

- **To Know the important genera of microorganisms associated with dairy and their characteristics**
- **To study the role of microbes in fermentation, spoilage and food borne diseases.**

Unit 1: History & scope of Microbiology **12 Periods**

Introduction to microbiology, Historical Contribution of various scientists, scope of microbiology in food, Types of cell – Prokaryotic & Eukaryotic cell, Introduction to various types of micro-organisms, Structure of bacteria

Unit 2: Microbial growth in food **12 Periods**

Factors affecting growth of micro-organisms, Growth curve, Sources of contamination, causes of spoilage, Food in relation to disease- food borne poisoning, infections and intoxications

Unit-3: culture media and Pure culture Techniques **12 Periods**

Culture Media & its Composition, Types of culture media Methods for isolation of pure culture- Streak plate, Pour plate and Spread plate

Unit 4: Microscopy and Staining Procedures **12 Periods**

Introduction & types of microscope, Definition of dye & stains, classification of stains- Acidic, Basic and Neutral, principles, procedure, mechanism & applications of staining procedures: simple staining, negative staining, differential staining- gram staining & acid fast staining

Unit-5: Beneficial microorganisms and Microbial spoilage 12 Periods

Beneficial microorganisms and Microbial spoilage of meat, poultry fish; fruits & vegetables; cereal & cereal products and milk & milk products.

References:

- Food Microbiology (2013) William C Frazier
- Dairy Microbiology (2005) Richard K. Robinsons
- Dairy Microbiology : A Practical approach PhotisPapademas (2014)

B. Voc. First Year Paper No. BDT-2.1 Semester II

Food Preservation Technology (Practical-Skill Component)

Maximum Marks: 150 Credits: 6

Teaching Period: 4 Theory Teaching Load: 60 Theory Period

Objectives-

- **To study methods of preservation of foods**
- **To study the natural and chemical preservatives i.e. Class I and Class II Preservatives**

1. Study of Class I and Class II Preservatives 3P
2. Preservation by Salt (Pickle, Fish) 2P
3. Preservation by Sugar (Jam, Jelly) 2P
4. Preservation by Oil (Vegetable Pickle) 2P
5. Preservation by Chemical preservative (Squash, Ketchup) 2P
6. Preservation by Low temperature (Chilling & Freezing) Peas 3P
7. Preservation by High temperature (Blanching, Pasteurization) Vegetables, Fruits, Milk 4P
8. Preservation by Drying (Sun and Mechanical) Spinach, Grapes 2P
9. Preservation by use of acidulants: Preparation of Tomato products 2P
10. Preservation by Osmotic Dehydration 2P
11. Activity– which are preservative used in food and prepare the list and write the uses

B. Voc. First Year Paper No. BDT-2.2 Semester II

Dairy Microbiology (Practical-Skill Component)

Maximum Marks: 150 Credits: 6

Teaching Period: 4 Theory Teaching Load: 60 Theory Period

Objectives-

- **To know basic microbiology laboratory practices and equipment**
- **To study the preparation of media, culture, identify micro organisms**

1. Introduction to basic microbiology laboratory practices 2P
2. Study of compound microscope 2P
3. Study of instruments used in Microbiology lab 2P

4. Microbiological media preparations (Sabrouts, McConkeys, Nutrient, Blood, Chocolate) 3P
5. Gram Staining 1P
6. Monochrome staining 1P
7. Cleaning and methods of sterilization 2P
8. Cultivation and sub culturing of microbes 2P
9. Microbial sampling 1P
10. Standard plate count method 2P
11. Isolation of E-coli from food sample 2P
12. Colony characterization 2P
13. Industrial quality control lab visit 2P
14. Activities – Study of swab test
    Study the difference between fresh and spoiled food .

B. Voc. First Year **Paper No. BDT-2.3** **Semester II**

Computer Application (Practical-Skill Component)

Maximum Marks: 150 **Credits: 6**

Teaching Period: 4 Theory **Teaching Load: 60 Theory Period**

Objectives-

- **To study the computer machine and operating system**
- **To study the different programmes for development of websites and designing of packaging labels.**

1. Introducing Computer and Operating system 1P
2. MS-WORD 2P
3. MS-EXCEL 2P
4. MS-POWERPOINT 2P
5. Introduction to the internet, search engine 2P
6. E-Mails, Google Docs and Forms 3P
7. Introduction to Page maker 3P
8. Introduction to Corel Draw 3P
9. Introduction to Photoshop 2P
10. Web development: HTML and Scripting language 2P
11. How to search research papers. 1P
12. How to convert word to pdf and vice versa 1P
13. Activity- Report preparation

References*:*

1) Microsoft Office 2000 by Vipra Computers, Vipraprinters pvt. Ltd.

2) Advanced Maicrosoft Office 2000 by Mereditha Flynin, Nita Rukosky, BPB pub.

3) Teach yourself Windows

4) Fundaments of Computers - V. Rajaram

5) Computer Fundamentals by P. K. Sinha &Priti Sinha, 4th edition, BPB, publication.